Claims

We claim:

1.   A circuit-characterization system, comprising:

a computer configured to:

degrade, by using an absolute-from-breakdown value, a characteristic of a circuit to

calculate a degraded characteristic of the circuit; and

characterize, according to a model of an operation of the circuit, a constraint of the circuit

to select a value for the constraint,

wherein the selected value for the constraint depends, at least in part, on the degraded

characteristic of the circuit.

2.   The circuit-characterization system of claim 1, in which the characteristic comprises the

delay of the circuit.

3.   The circuit-characterization system of claim 2, in which the circuit comprises a storage

circuit.

4.   The circuit-characterization system of claim 3, in which the constraint comprises a setup

time of the storage circuit.

5.   The circuit characterization system of claim 3, in which the constraint comprises a hold

time of the storage circuit.

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6.   A computer program product, comprising:

a computer application, adapted for processing by a computer, the application causing the

computer to:

degrade, by using an absolute-from-breakdown value, a characteristic of a circuit to

calculate a degraded characteristic of the circuit; and

characterize, according to a model of an operation of the circuit, a constraint of the circuit

to select a value for the constraint,

wherein the selected value for the constraint depends, at least in part, on the degraded

characteristic of the circuit.

7.   The computer program product of claim 6, in which the characteristic comprises the delay

of the circuit.

8.   The computer program product of claim 7, in which the circuit comprises a storage

circuit.

9.   The computer program product of claim 8, in which the constraint comprises a setup time

of the storage circuit.

10.   The computer program product of claim 8, in which the constraint comprises a hold time

of the storage circuit.

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11.   A method of characterizing a circuit, comprising:

degrading, by using an absolute-from-breakdown value, a characteristic of the circuit to

calculate a degraded characteristic of the circuit; and

characterizing, by using a model of an operation of the circuit, a constraint of the circuit

5   to select a value for the constraint,

wherein the selected value for the constraint depends, at least in part, on the degraded

characteristic of the circuit.

10   12.   The method of claim 11, in which the characteristic comprises the delay of the circuit.

13.   The method of claim 12, in which the circuit comprises a storage circuit.

14.   The method of claim 13, in which the constraint comprises a setup time of the storage

15   circuit.

15.   The method of claim 13, in which the constraint comprises a hold time of the storage

circuit.

20   16.   A circuit-characterization system, comprising:

a computer configured to:

degrade, by using a unity-slope value, a characteristic of a circuit to calculate a degraded

characteristic of the circuit; and

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characterize, according to a model of an operation of the circuit, a constraint of the circuit

to select a value for the constraint,

wherein the selected value for the constraint depends, at least in part, on the degraded

characteristic of the circuit.

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17.   The circuit-characterization system of claim 16, in which the characteristic comprises the

delay of the circuit.

18.   The circuit-characterization system of claim 17, in which the circuit comprises a storage

10   circuit.

19.   The circuit-characterization system of claim 18, in which the constraint comprises a setup

time of the storage circuit.

15   20.   The circuit characterization system of claim 18, in which the constraint comprises a hold

time of the storage circuit.

21.   A computer program product, comprising:

a computer application, adapted for processing by a computer, the application causing the

20   computer to:

degrade, by using a unity-slope value, a characteristic of a circuit to calculate a degraded

characteristic of the circuit; and

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characterize, according to a model of an operation of the circuit, a constraint of the circuit

to select a value for the constraint,

wherein the selected value for the constraint depends, at least in part, on the degraded

characteristic of the circuit.

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22.   The computer program product of claim 21, in which the characteristic comprises the

delay of the circuit.

23.   The computer program product of claim 22, in which the circuit comprises a storage

10   circuit.

24.   The computer program product of claim 23, in which the constraint comprises a setup

time of the storage circuit.

15   25.   The computer program product of claim 23, in which the constraint comprises a hold time

of the storage circuit.

26.   A method of characterizing a circuit, comprising:

degrading, by using a unity-slope value, a characteristic of the circuit to calculate a

20   degraded characteristic of the circuit; and

characterizing, by using a model of an operation of the circuit, a constraint of the circuit

to select a value for the constraint,

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wherein the selected value for the constraint depends, at least in part, on the degraded

characteristic of the circuit.

5   27.   The method of claim 26, in which the characteristic comprises the delay of the circuit.

28.   The method of claim 27, in which the circuit comprises a storage circuit.

29.   The method of claim 28, in which the constraint comprises a setup time of the storage

10   circuit.

30.   The method of claim 28, in which the constraint comprises a hold time of the storage

circuit.

15   31.   A circuit-characterization system, comprising:

a computer configured to:

degrade, by using a normalized-intersection value, a characteristic of a circuit to

calculate a degraded characteristic of the circuit; and

characterize, according to a model of an operation of the circuit, a constraint of the circuit

20   to select a value for the constraint,

wherein the selected value for the constraint depends, at least in part, on the degraded

characteristic of the circuit.

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32.   The circuit-characterization system of claim 31, in which the characteristic comprises the delay of the circuit.

33.   The circuit-characterization system of claim 32, in which the circuit comprises a storage circuit.

34.   The circuit-characterization system of claim 33, in which the constraint comprises a setup time of the storage circuit.

35.   The circuit characterization system of claim 33, in which the constraint comprises a hold time of the storage circuit.

36.   A computer program product, comprising:

a computer application, adapted for processing by a computer, the application causing the

computer to:

degrade, by using a normalized-intersection value, a characteristic of a circuit to

calculate a degraded characteristic of the circuit; and

characterize, according to a model of an operation of the circuit, a constraint of the circuit

to select a value for the constraint,

wherein the selected value for the constraint depends, at least in part, on the degraded

characteristic of the circuit.

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37.   The computer program product of claim 36, in which the characteristic comprises the delay of the circuit.

38.   The computer program product of claim 37, in which the circuit comprises a storage circuit.

39.   The computer program product of claim 38, in which the constraint comprises a setup time of the storage circuit.

40.   The computer program product of claim 38, in which the constraint comprises a hold time of the storage circuit.

41.   A method of characterizing a circuit, comprising:

        degrading, by using a normalized-intersection value, a characteristic of the circuit to

                calculate a degraded characteristic of the circuit; and

        characterizing, by using a model of an operation of the circuit, a constraint of the circuit

                to select a value for the constraint,

        wherein the selected value for the constraint depends, at least in part, on the degraded

                characteristic of the circuit.

42.   The method of claim 41, in which the characteristic comprises the delay of the circuit.

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43.   The method of claim 42, in which the circuit comprises a storage circuit.

44.   The method of claim 43, in which the constraint comprises a setup time of the storage

circuit.

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45.   The method of claim 43, in which the constraint comprises a hold time of the storage

circuit.

46.   A circuit-characterization system, comprising:

        a computer configured to:

        according to a model of an operation of an electronic circuit, characterize a first

                dependent constraint of the electronic circuit to select a value for the first

                dependent constraint at a prescribed initial value of a second dependent constraint

                of the electronic circuit; and

        according to the model of the operation of the electronic circuit, characterize the second

                dependent constraint to select a value for the second dependent constraint that

                depends at least in part on the value selected for the first dependent constraint.

47.   The circuit-characterization system of claim 46, in which the computer is configured to:

20   degrade, by using a first degradation option, a characteristic of the circuit to calculate a

                first degraded characteristic of the circuit,

        wherein the selected value for the first dependent constraint depends, at least in part, on

                the first degraded characteristic of the circuit, and

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wherein the first degradation option is selected from a group consisting of an absolute-from-breakdown option, a unity-slope option, and a normalized intersection option.

5   48.   The circuit-characterization system of claim 47, in which the computer is configured to:

degrade, by using a second degradation option, the characteristic of the circuit to calculate a second degraded characteristic of the circuit,

wherein the selected value for the second dependent constraint depends, at least in part, on the second degraded characteristic of the circuit, and

10   wherein the second degradation option is selected from the group consisting of an absolute-from-breakdown option, a unity-slope option, and a normalized intersection option.

49.   The circuit-characterization system of claim 48, wherein the characteristic comprises the

15   delay of the circuit.

50.   The circuit-characterization system of claim 49, wherein the circuit comprises a storage circuit.

20   51.   The circuit-characterization system of claim 50, wherein:

the first constraint comprises a setup time of the storage circuit; and

the second constraint comprises a hold time of the storage circuit.

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52.   A computer program product, comprising:

a computer application, adapted for processing by a computer circuitry, the application

causing the computer to:

according to a model of an operation of an electronic circuit, characterize a first

5   dependent constraint of the electronic circuit to select a value for the first

dependent constraint at a prescribed initial value of a second dependent constraint

of the electronic circuit; and

according to the model of the operation of the electronic circuit, characterize the second

dependent constraint to select a value for the second dependent constraint that

10   depends at least in part on the value selected for the first dependent constraint.

53.   The computer program product of claim 52, in which the computer application further

causes the computer to:

degrade, by using a first degradation option, a characteristic of the circuit to calculate a

first degraded characteristic of the circuit,

15   wherein the selected value for the first dependent constraint depends, at least in part, on

the first degraded characteristic of the circuit, and

wherein the first degradation option is selected from a group consisting of an absolute-

from-breakdown option, a unity-slope option, and a normalized intersection

20   option.

54.   The computer program product of claim 53, in which the computer application further

causes the computer to:

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degrade, by using a second degradation option, the characteristic of the circuit to calculate

a second degraded characteristic of the circuit,

wherein the selected value for the second dependent constraint depends, at least in part,

on the second degraded characteristic of the circuit, and

5   wherein the second degradation option is selected from the group consisting of an

absolute-from-breakdown option, a unity-slope option, and a normalized

intersection option.

55.   The computer program product of claim 54, wherein the characteristic comprises the

10   delay of the circuit.

56.   The computer program product of claim 55, wherein the circuit comprises a storage

circuit.

15   57.   The computer program product of claim 56, wherein:

the first constraint comprises a setup time of the storage circuit; and

the second constraint comprises a hold time of the storage circuit.

58.   A method of characterizing an electronic circuit, comprising:

20   characterizing, by using a model of an operation of the electronic circuit, a first dependent

constraint of the electronic circuit to select a value for the first dependent

constraint at a prescribed initial value of a second dependent constraint of the

electronic circuit; and

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characterizing, by using the model of the operation of the electronic circuit, the second

dependent constraint to select a value for the second dependent constraint that

depends at least in part on the value selected for the first dependent constraint.

5   59.   The method of claim 58, further comprising:

degrading, by using a first degradation option, a characteristic of the circuit to calculate a

first degraded characteristic of the circuit,

wherein the selected value for the first dependent constraint depends, at least in part, on

the first degraded characteristic of the circuit, and

10   wherein the first degradation option is selected from a group consisting of an absolute-

from-breakdown option, a unity-slope option, and a normalized intersection

option.

60.   The method of claim 59, further comprising:

15   degrading, by using a second degradation option, the characteristic of the circuit to

calculate a second degraded characteristic of the circuit,

wherein the selected value for the second dependent constraint depends, at least in part,

on the second degraded characteristic of the circuit, and

wherein the second degradation option is selected from the group consisting of an

20   absolute-from-breakdown option, a unity-slope option, and a normalized

intersection option.

61.   The method of claim 60, wherein the characteristic comprises the delay of the circuit.

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62.   The method of claim 61, wherein the circuit comprises a storage circuit.

63.   The method of claim 62, wherein:

5   the first constraint comprises a setup time of the storage circuit; and

        the second constraint comprises a hold time of the storage circuit.

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